INTERACTIONS, INTERDIFFUSION AND SEGREGATION IN QUANTUM DOT ENSEMBLES.

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Statistically non-interacting quantum dot ensembles can be achieved by raising surface energies during growth [1]. This also produces large concentration variations in simultaneous growths of InGaAs quantum dots (QDs) by step edge nucleation control on vicinal GaAs [001]. These QD surface density variations radically affect their optical properties. Strong strain interactions between QDs in dense ensembles are seen to blue-shift emission energies, narrow inter-sub-level transition energies, shorten luminescence decay times for excited states, and increase inhomogeneous photoluminescence broadening [2]. These effects are compared to recent results obtained in QDs after InGaAs/GaAs interfacial compositional disordering [3]. Different relaxation (capture and escape) mechanisms become predominant in isolated and interacting (high density) QDs, resulting in different temperature dependencies of PL energy shifts, intensities, inhomogeneous line-width broadening and rise times. Some of these observations are attributed to inhibited carrier capture and re-capture into the QDs. Low temperature carrier trapping at potential fluctuations in the wetting layer (WL) might be explained by Indium enrichment found in ternary InGaAs QDs [4] in terms of alloy variations in the Wetting Layer. Also of interest, is the finding that dot ensembles showing well-defined zero-dimensional properties are unstable against ripening. The impact of these findings on QD based device applications will be discussed.

[1] R. Leon, C. Lobo, J. Zou, T. Romeo, and D. J. H. Cockayne, *Phys. Rev. Lett.* **81**, 2486 (1998).
[2] R. Leon, S. Marcinkevicius, X. Z. Liao, J. Zou, D. J. H. Cockayne, and S. Fafard, *Phys. Rev. B* **60**, R8517 (1999)
[3] R. Leon, S. Fafard, P.G. Piva, S. Ruvimov and Z. Liliental-Weber, *Phys. Rev. B* **58**, R4262, (1998)
[4] X. Z. Liao, J. Zou, D. J. H. Cockayne, R. Leon, and C. Lobo, *Phys. Rev. Lett.* **82**, 5148 (1999).

Symposium K: Morphological and Compositional Evolution of Heteroepitaxial Semiconductor Thin Films

Strain has a tremendous effect on the morphology and composition of heteroepitaxial semiconductor thin films. Recent progress in strained island formation and in the morphological and compositional instabilities induced by heteroepitaxial stress has lead to new theoretical and experimental advances, as well as to promising materials for various optoelectronic applications. This symposium offers to bring together the leading research groups that are focusing on these and related problems in order to survey the important advances as well as breaking news in these directions.

This symposium will focus on mechanisms *rather than materials*, thus, papers for different semiconductor systems, including SiGe, III-V, nitrides, or II-VI semiconductors are solicited. Furthermore, issues on growth, characterization, and modeling of morphological and compositional non-uniformities, as well as devices based on these types of structures, will be addressed.

Specific topics of interest include, but are not limited to:

* Stress-induced morphological and compositional instabilities
* Strained island formation and quantum dots
* Growth mechanisms of composition modulation and spontaneous ordering
* Compositional uniformity in ternary and quaternary alloys
* Adatom interactions with surface features
* Segregation, strain-induced diffusion, and defect formation
* *In situ* and scanning probe characterization of morphological and compositional evolution
* Optical and electronic properties of self-assembled, modulated, or spontaneously ordered materials
* Devices based on self-assembled, low-dimensional structures

Joint sessions are anticipated with Symposium L: *Recent Developments in Oxide and Metal Epitaxy‹Theory and Experiment.* Also, a poster session is planned.

Invited speakers (tentative) include: Michael Aziz (Harvard Univ.); **Pallab Bhattacharya** (Univ. of Michigan); **Dieter Bimberg** (Technische Univ. Berlin); **Jerry Floro** (Sandia Natl. Labs); **Rachel Goldman** (Univ. of Michigan); **Fritz Henneberger** (Technische Univ. Berlin); **Bruce Joyce** (Imperial College); **Max Lagally** (Univ. of Wisconsin); **Rosa Leon** (Jet Propulsion Lab); **Anupan Madhukar** (Univ. of Southern California); **Normand Modine** (Sandia Natl. Labs); **Pierre Petroff** (Univ. of California-Santa Barbara); **Catherine Priester** (IEMN, France); **David Srolovitz** (Princeton Materials Inst.); **Jerry Tersoff** (IBM); **Rudy Tromp** (IBM); **Peter Voorhees** (Northwestern Univ.); **Stan Williams** (Hewlett Packard); and **Dietrich Wolf** (Univ. of Duisburg, Germany).

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